



IR spectroscopy with pyrolytic carbon string resonator as a tool for particle detection

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IR spectroscopy with pyrolytic carbon string resonator as a tool for particle detection

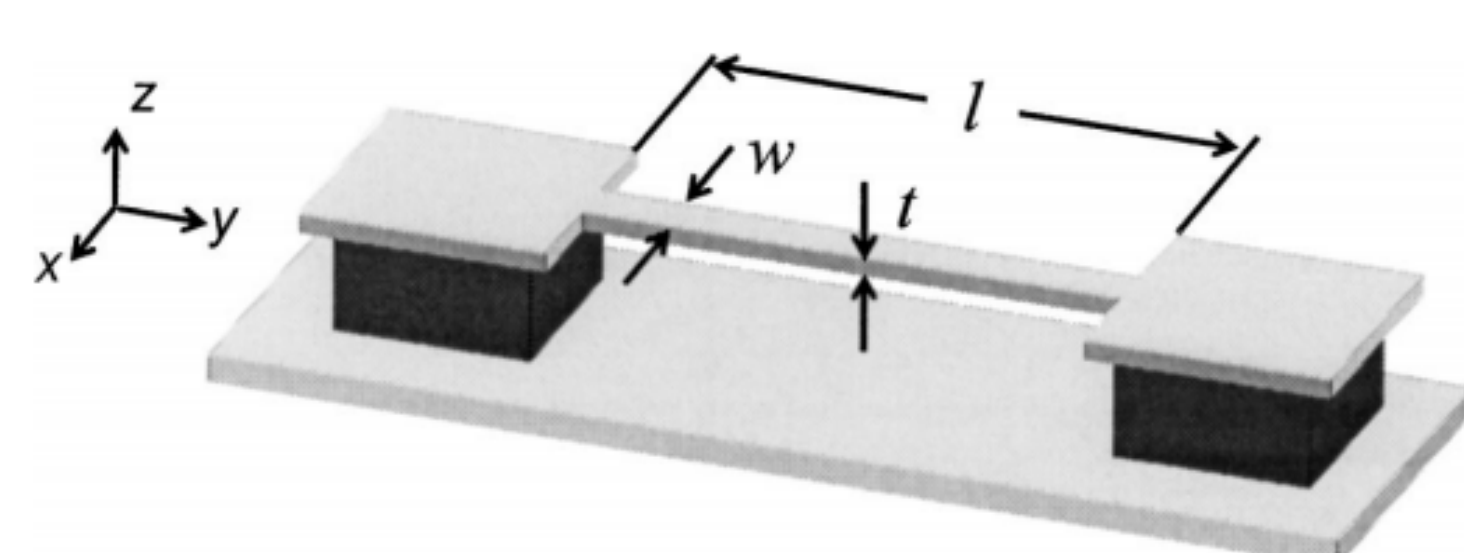
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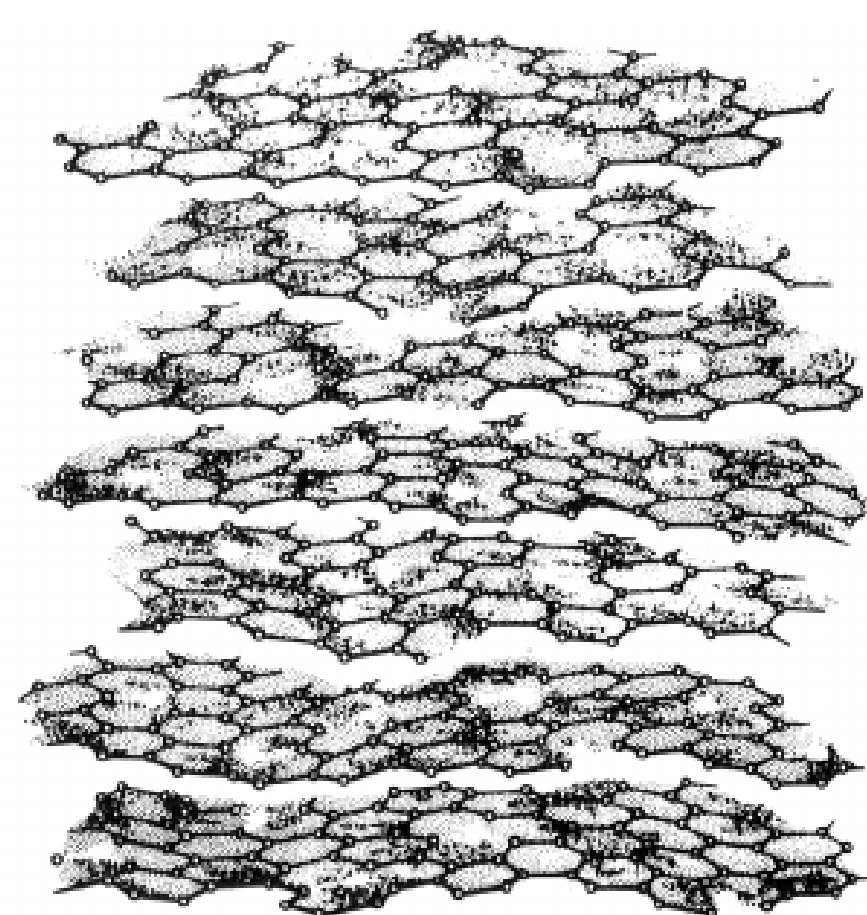
^b Institute of Sensor and Actuator Systems, Vienna University of Technology, Gusshausstraße 27-29, A-1040 Vienna, Austria

INTRODUCTION

MEMS String Resonator



Pyrolytic Carbon

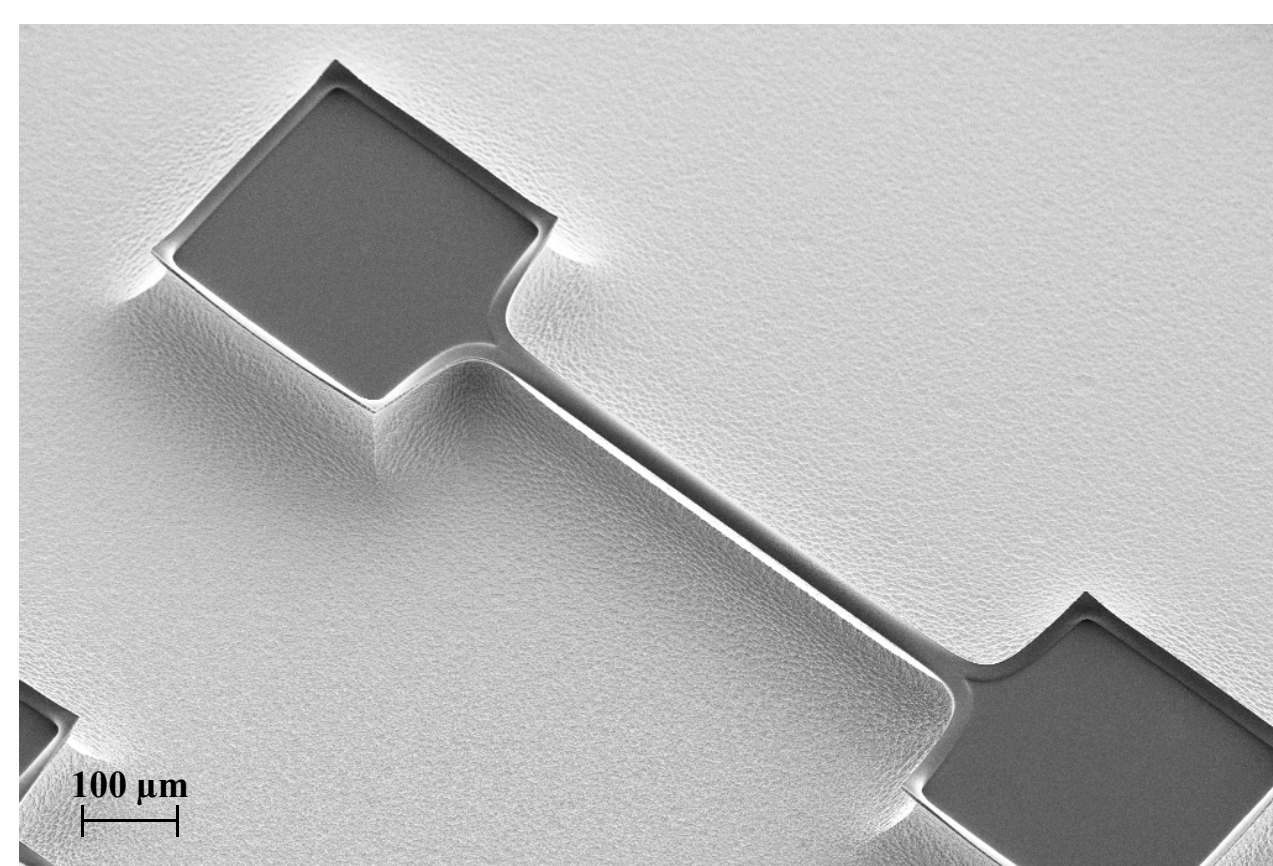


Isotropic properties

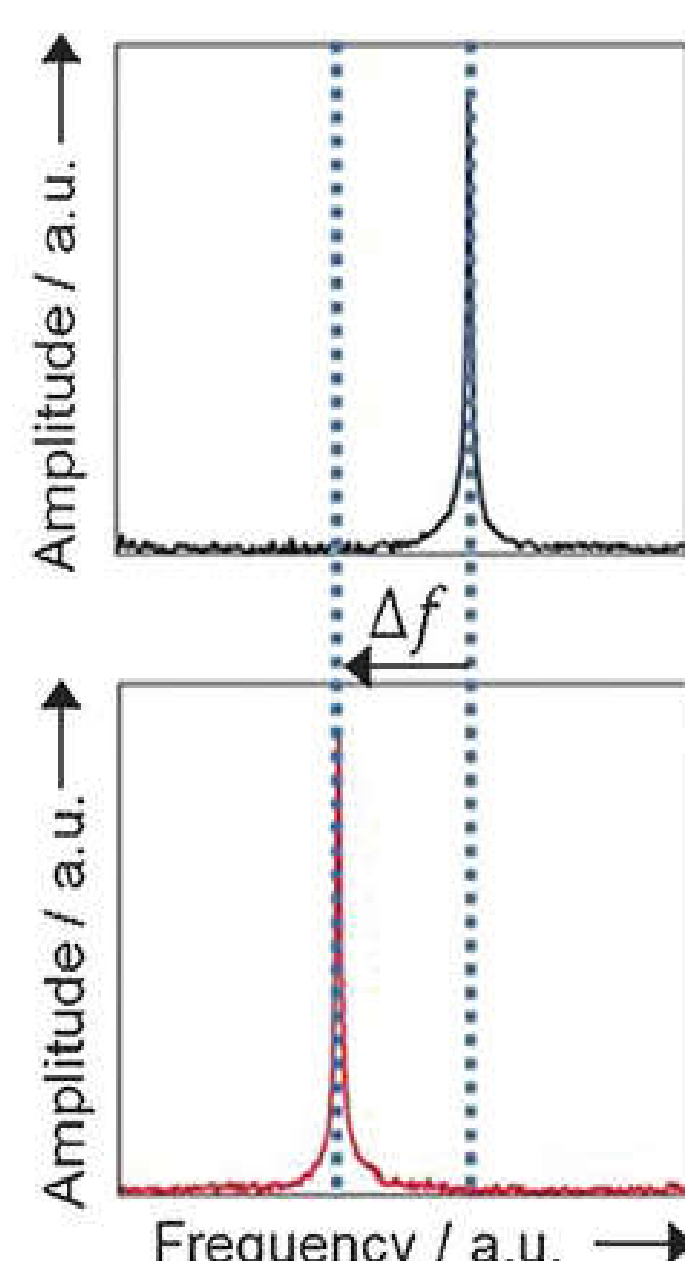
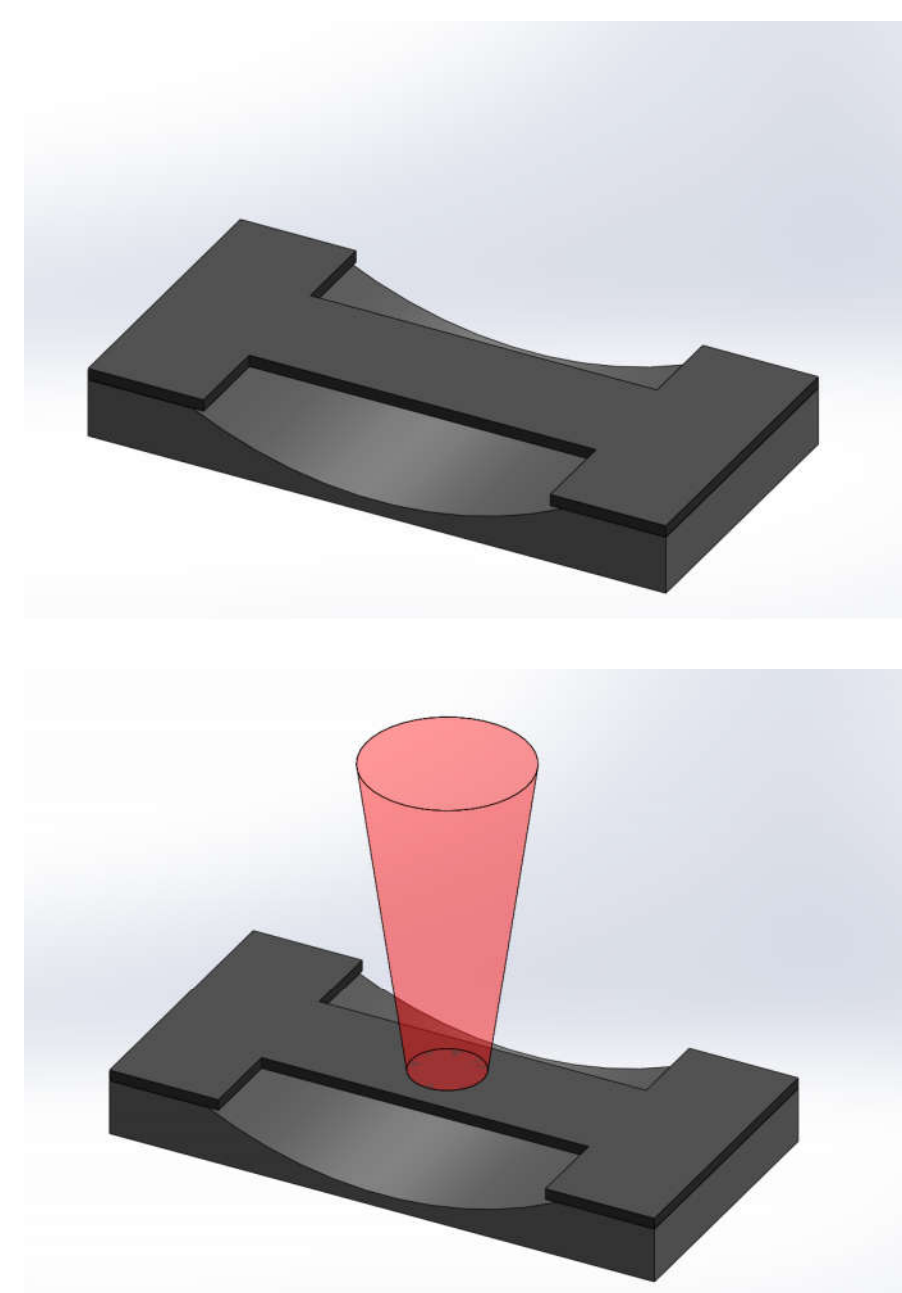
Conductive material

Controlable properties

Pyrolytic Carbon String Resonator



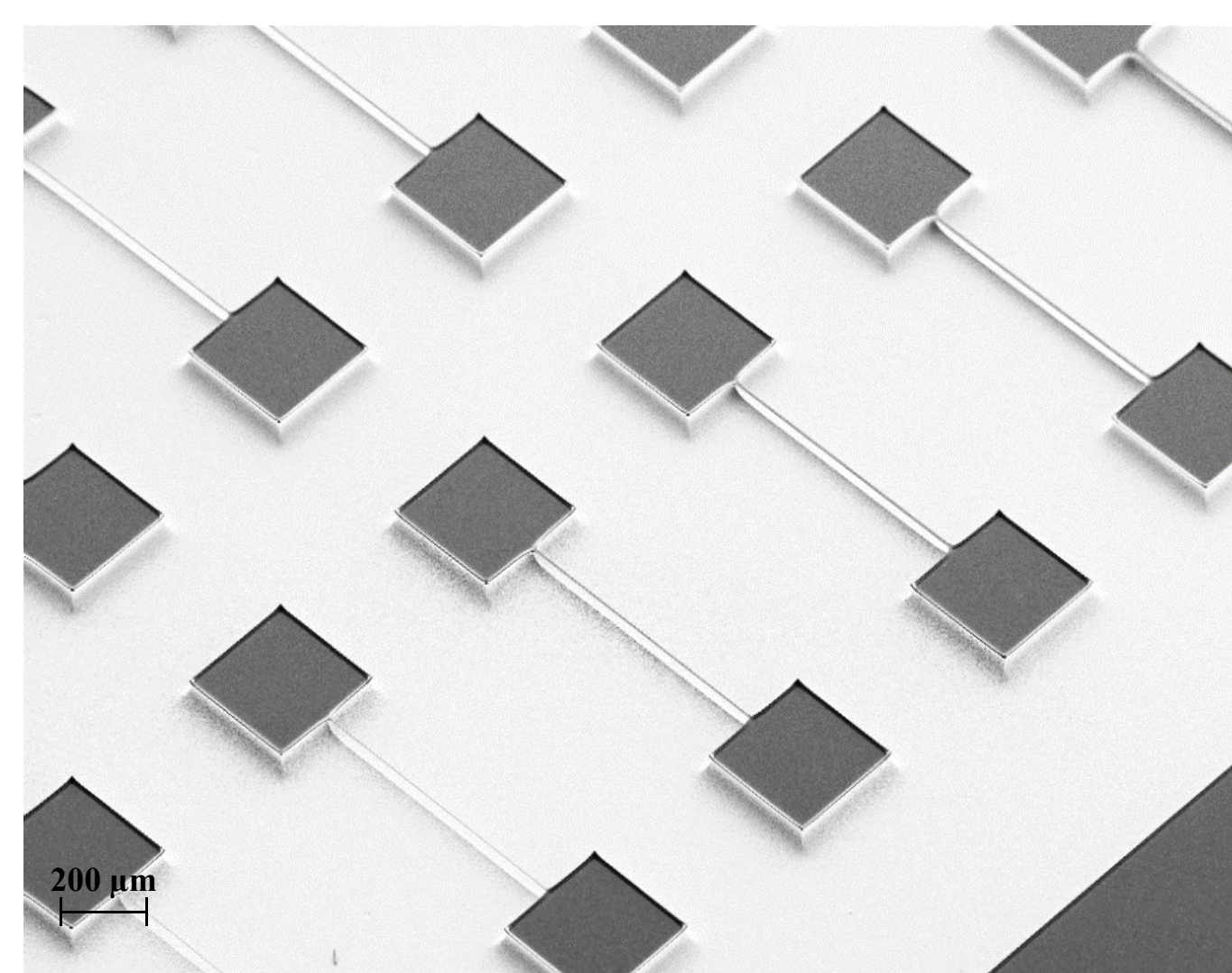
Infrared Spectroscopy



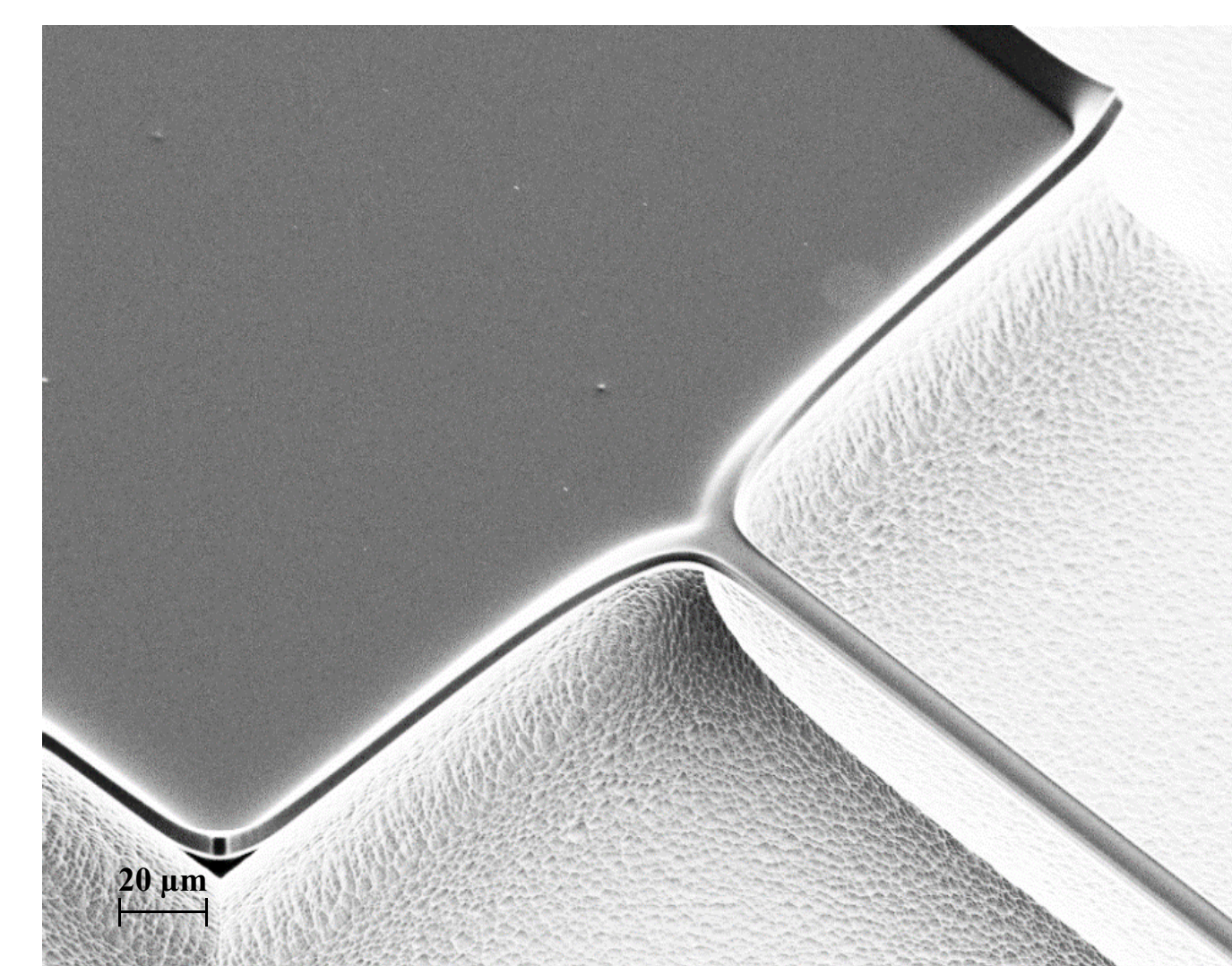
References:
S. Yamada, et al, Anal. Chem. 85, (2013) 10531-5.
M. Kurek, et al, Angewandte Chemie 56, (2017), 3901-3905.

RESULTS AND DISCUSSION

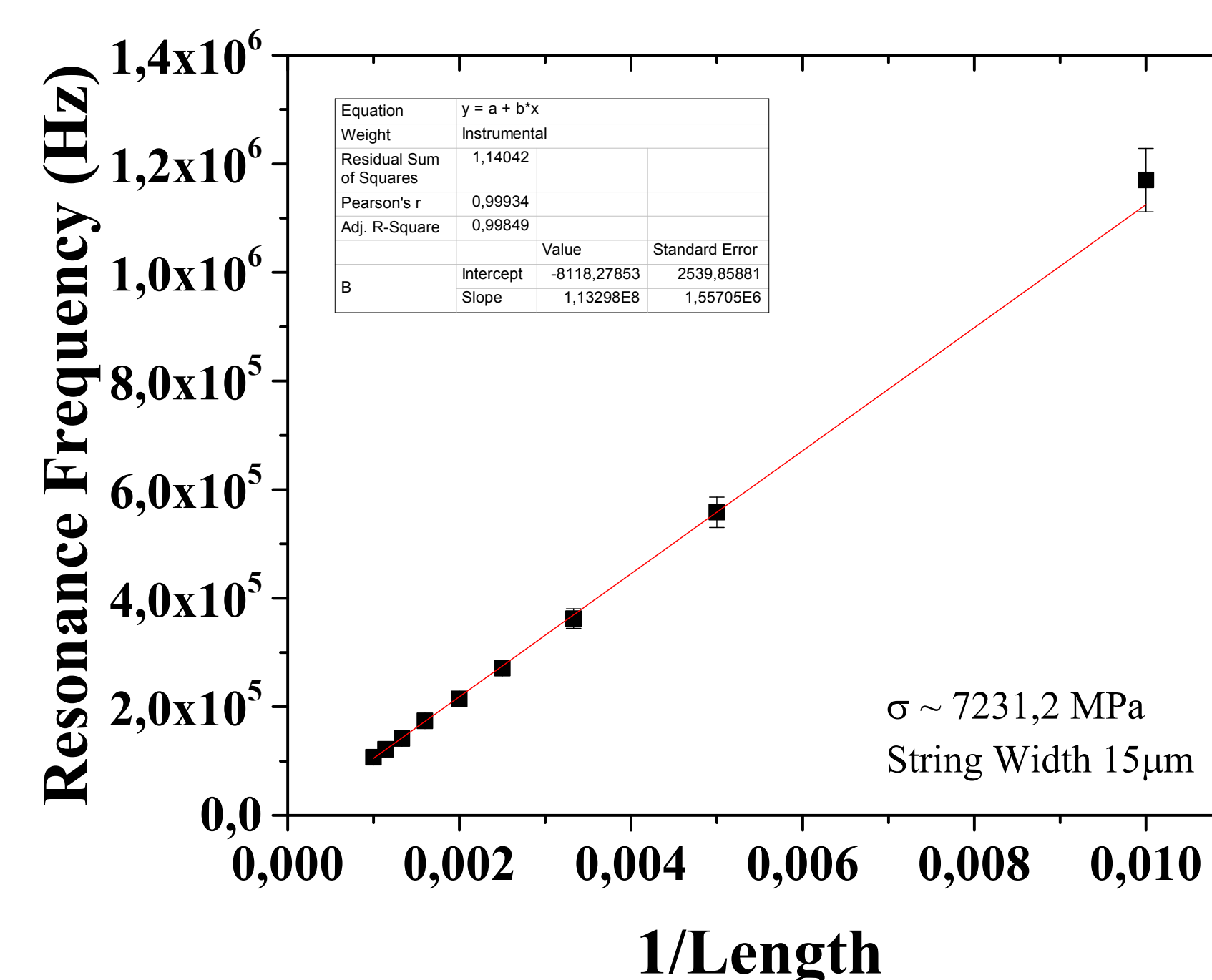
SEM image of pyrolytic carbon string



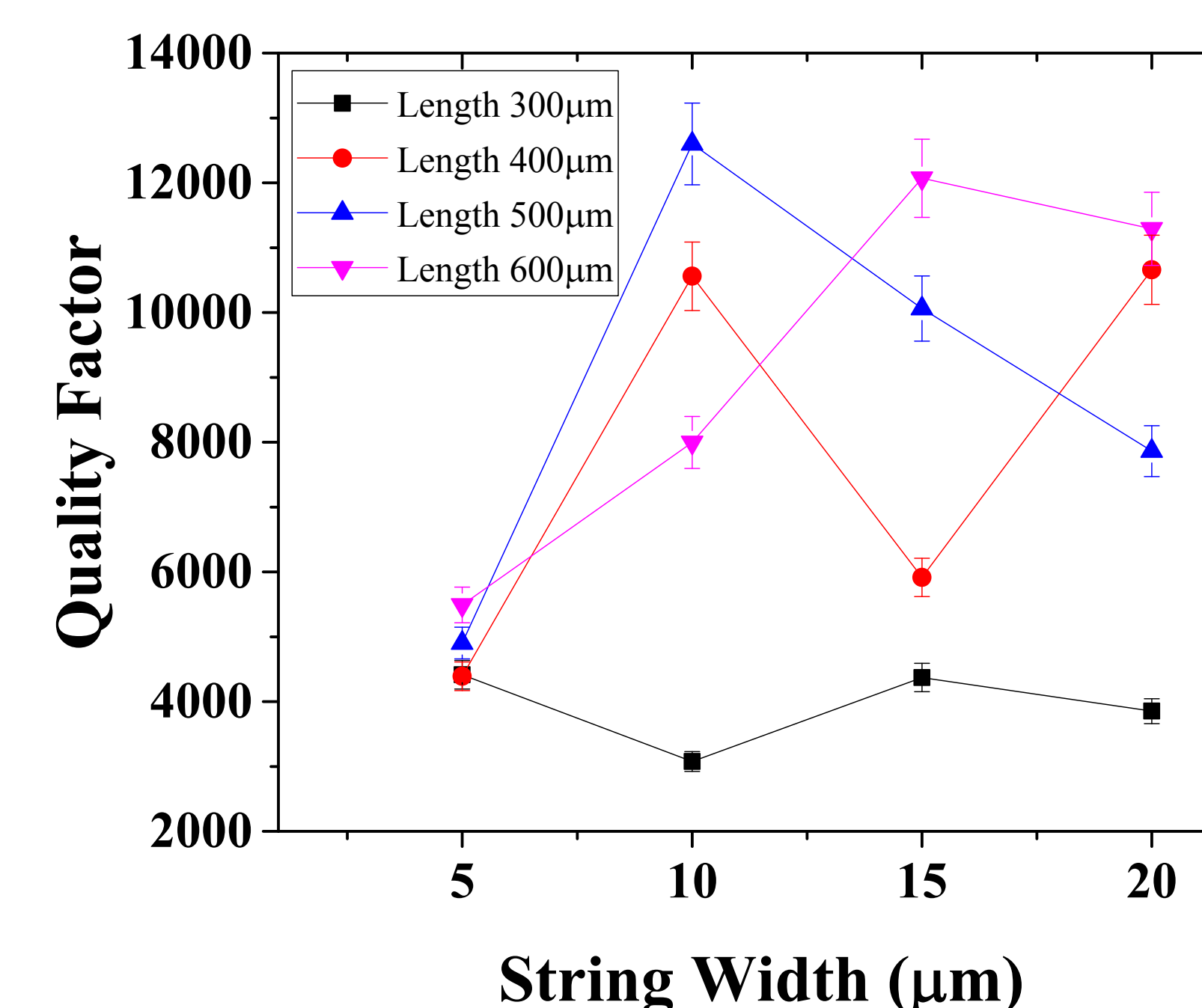
Length 500μm
Thickness 700nm



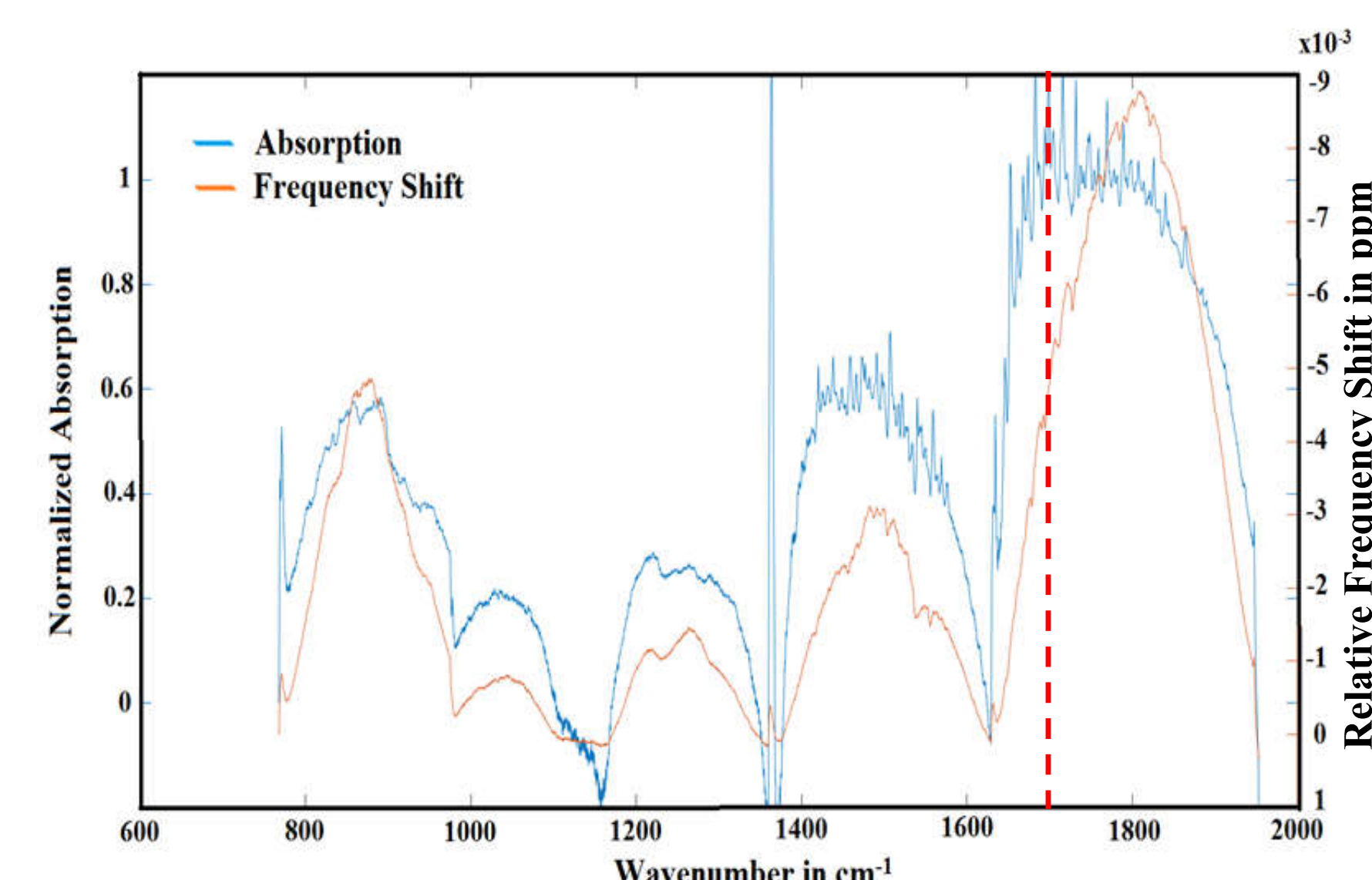
Resonance Frequency



Quality Factor

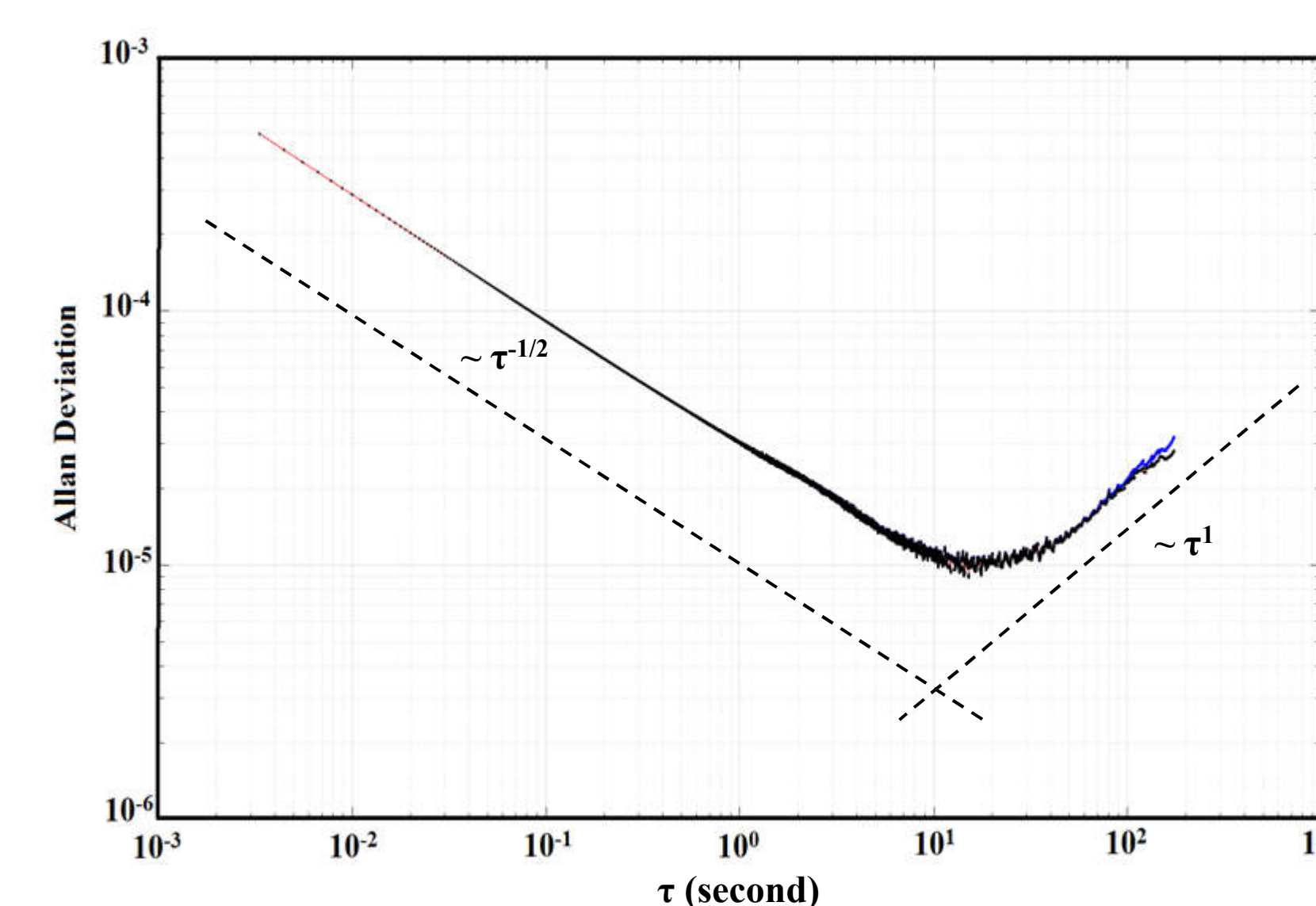


IR Absorption



An absorption peak at 1760cm⁻¹

Allan Deviation



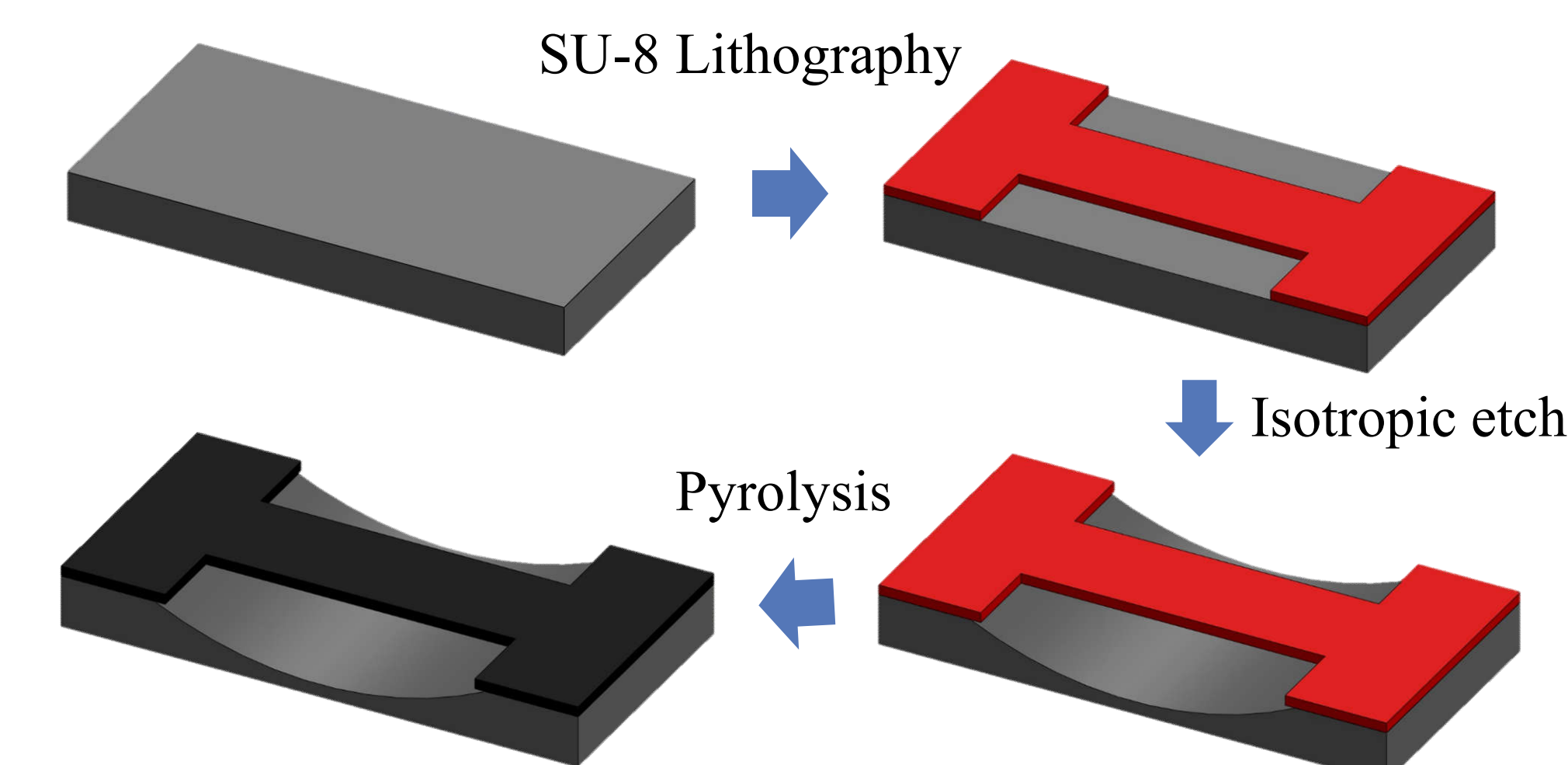
Minimum AD of 10ppm at 10 seconds

CONCLUSION

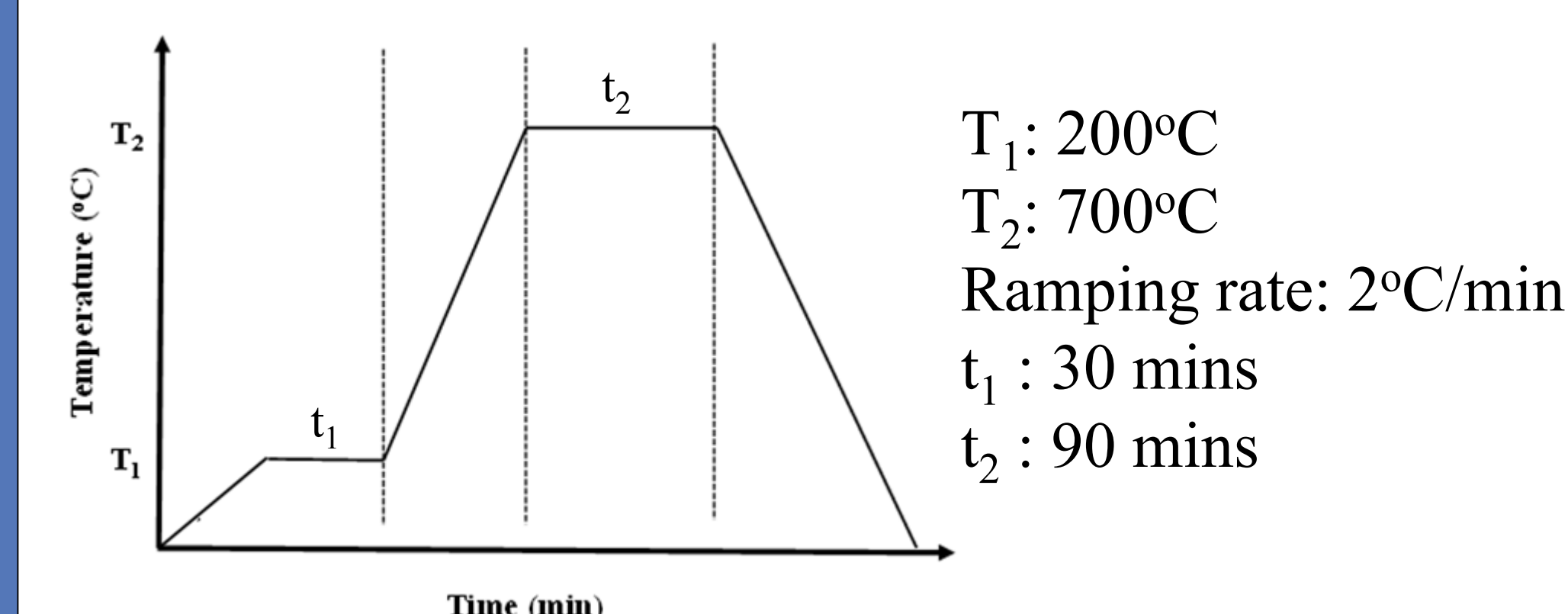
We demonstrate the fabrication of the pyrolytic carbon string resonators with optimized process. The carbon string resonators are then characterized by interferometry to obtain the resonance frequency and Q factor. A resonant photothermal IR absorption measurement shows the absorption spectrum of the materials. The results show the potential of the pyrolytic carbon string resonators as a tool for particle detection.

MATERIALS AND METHOD

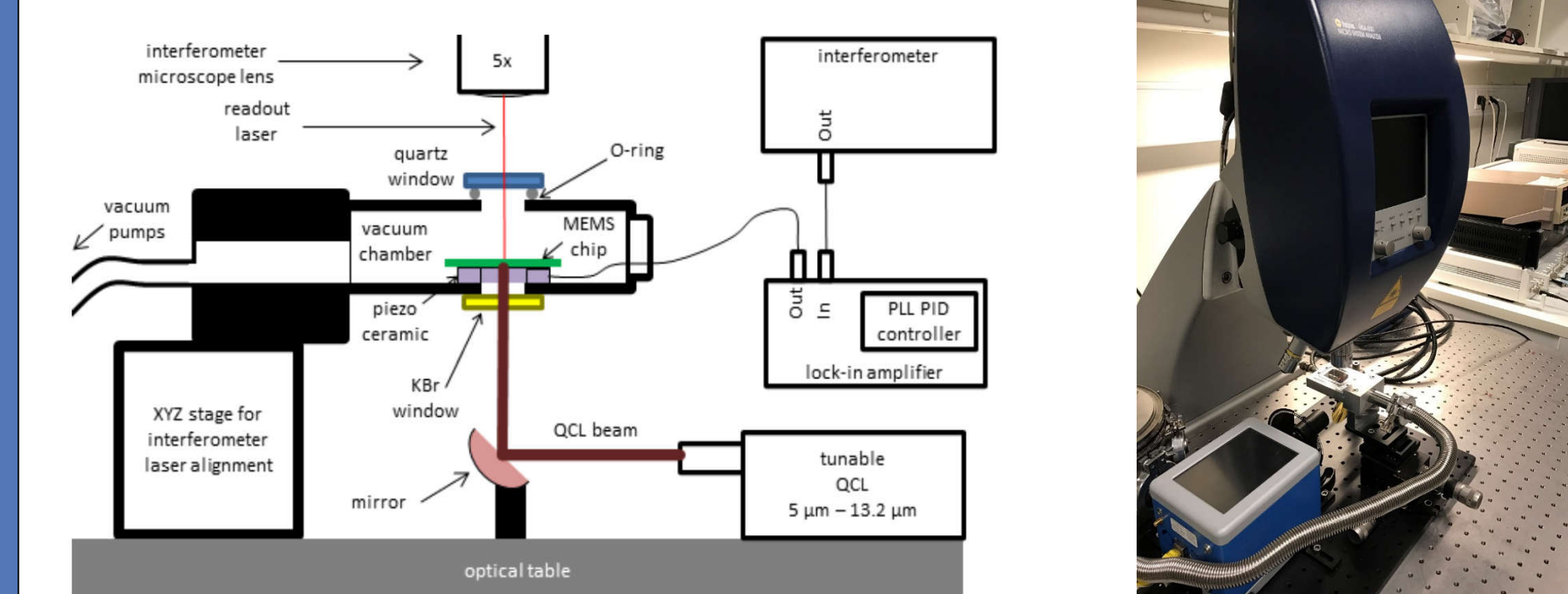
Fabrication



Pyrolysis process



Characterization



ACKNOWLEDGEMENT

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Danish National Research Foundation's and the Villum Foundation's Center for Intelligent Drug delivery and Sensing Using Microcontainers and Nanomechanics

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